WHAT IS CLAIMED IS:

1. A clock skew measuring apparatus for measuring a clock skew between a plurality of clock signals to be measured in a device under test, comprising:

a clock signal selecting element operable to receive said plurality of clock signals to be measured and to output said plurality of clock signals to be measured by selecting one of said plurality of clock signals to be measured one by one; and

a clock skew estimator operable to receive a reference signal input to said device under test and said plurality of clock signals to be measured output from said clock signal selecting element and to obtain said clock skew between said plurality of clock signals to be measured by measuring a timing difference between said received reference signal and each of said plurality of clock signals to be measured.

2. A clock skew measuring apparatus as claimed in claim 1, further comprising:

a plurality of buffers operable to respectively supply said plurality of clock signals to be measured to said clock signal selecting element; and

a controller operable to control whether or not each of said plurality of buffers supplies a corresponding one of said plurality of clock signals to be measured to said clock signal selecting element.

3. A clock skew measuring apparatus as claimed in claim 1 or 2, wherein said clock skew estimator measures a deterministic component of said clock skew between said plurality of clock signals to be measured.

4. A clock skew measuring apparatus as claimed in claim 1 or 2, wherein said clock skew estimator measures a random component of

said clock skew between said plurality of clock signals to be measured.

5. A clock skew measuring apparatus as claimed in any one of claims 1 to 4, wherein said clock skew estimator includes:

a timing estimator operable to obtain a reference timing that is an edge timing of said reference signal and a tested timing that is an edge timing of each of said plurality of clock signals to be measured;

a timing error estimator operable to obtain said timing difference between said tested timing and said reference timing; and

a clock skew calculator operable to obtain said clock skew between said plurality of clock signals to be measured from said timing difference obtained for each of said plurality of clock signals to be measured.

6. A clock skew measuring apparatus as claimed in claim 5, wherein said clock skew estimator further includes a corrector operable to correct said clock skew obtained by said clock skew calculator.

7. A clock skew measuring apparatus as claimed in claim 5 or 6, wherein said timing estimator obtains a rising edge timing or a falling edge timing of each of said reference signal and said plurality of clock signals to be measured.

8. A clock skew measuring apparatus as claimed in claim 5 or 6, wherein said timing estimator includes:

an analytic signal transformer operable to transform each of said plurality of clock signals to be measured into a complex analytic signal;

an instantaneous phase estimator operable to obtain an instantaneous phase of said analytic signal;

a linear instantaneous phase estimator operable to obtain

a linear instantaneous phase of each of said plurality of clock signals to be measured based on said instantaneous phase obtained; and

an initial phase estimator operable to obtain an ideal edge timing of each of said plurality of clock signals to be measured by obtaining an initial phase angle of said linear instantaneous phase.

9. A clock skew measuring apparatus as claimed in claim 8, wherein said timing estimator further includes:

a linear trend remover operable to remove said linear instantaneous phase from said instantaneous phase to obtain an instantaneous phase noise; and

a zero-crossing resampler operable to re-sample only data of said instantaneous phase noise around zero-crossing timings of a real part of said analytic signal and to output a timing jitter sequence of each of said plurality of clock signals to be measured.

10. A clock skew measuring apparatus as claimed in claim 8, wherein said analytic signal transformer includes:

a band-pass filter operable to receive each of said plurality of clock signals and to extract from said received clock signal frequency components around a fundamental frequency of said received clock signal thereby outputting a band-limited signal; and

a Hilbert transformer operable to perform Hilbert transformation for said band-limited signal to generate Hilbert transform pairs of said clock signal.

11. A clock skew measuring apparatus as claimed in claim 8, wherein said analytic signal transformer includes:

a time-domain to frequency-domain transformer operable to receive each of said clock signals to be measured and to transform

said received clock signal into two-sided spectra in a frequency domain;

a bandwidth limiter operable to extract from said two-sided spectra frequency components around a positive fundamental frequency thereof; and

a frequency-domain to time-domain transformer operable to inversely transform an output of said bandwidth limiter into a time-domain signal.

12. A clock skew measuring apparatus as claimed in claim 8, wherein said analytic signal transformer includes:

a buffer memory, to which each of said plurality of clock signals to be measured is supplied, operable to store said supplied clock signal;

an extracting portion operable to select and extract a section of said stored clock signal in such a manner that a section presently extracted partially overlaps a section previously extracted;

a window function multiplier operable to multiply said extracted section by a window function;

a transforming portion operable to transform said multiplied section into two-sided spectra in a frequency domain;

a bandwidth limiter operable to extract, from said two-sided spectra transformed in said frequency domain, frequency components around a positive fundamental frequency of said supplied clock signal to be measured;

an inverse transformer operable to inversely transforming an output of said bandwidth limiter into a time-domain signal; and

an inverse window function multiplier operable to multiply said time-domain signal by an reciprocal of said window function to obtain said analytic signal that has been band-limited.

13. A clock skew measuring apparatus as claimed in any one of

claims 1 to 6, wherein said clock skew estimator includes an analog-to-digital converter operable to receive said reference signal and each of said clock signals to be measured and to digitize said reference signal and said each of said clock signals to be measured.

14. A clock skew measuring apparatus as claimed in any one of claims 1 to 6, wherein said clock skew estimator includes a waveform clipper operable to receive said reference signal and each of said clock signals to be measured and to remove amplitude modulation components of said received clock signal to be measured to extract phase modulation components of said received clock signal.

15. A clock skew measuring apparatus as claimed in claim 8, wherein said analytic signal transformer is operable to be arranged to have a variable bandwidth of passband of each of said plurality of clock signals to be measured.

16. A clock skew measuring apparatus as claimed in claim 9, wherein said timing estimator further includes a low-frequency component remover operable to receive said instantaneous phase noise and to remove low frequency components of said instantaneous phase noise to output said instantaneous phase noise, from which said low frequency components have been removed, to said zero-crossing resampler.

17. A clock skew measuring method for measuring a clock skew between a plurality of clock signals to be measured in a device under test, comprising:

outputting said plurality of clock signals to be measured by selecting one of said plurality of clock signals to be measured one by one; and

obtaining said clock skew between said plurality of clock signals to be measured by measuring a timing difference between

reference signal input to said device under test and each of said plurality of clock signals to be measured one by one.

18. A clock skew measuring method as claimed in claim 17, wherein said reference signal is a system clock signal supplied to said device under test.

19. A clock skew measuring method as claimed in claim 17, wherein said outputting and selecting step includes determining which one of said plurality of clock signals is to be selected based on said reference signal.

20. A clock skew measuring method as claimed in any of claims 17 to 19, wherein said clock skew estimating step measures a deterministic component of said clock skew between said plurality of clock signals to be measured.

21. A clock skew measuring method as claimed in any of claims 17 to 19, wherein said clock skew estimating step measures a random component of said clock skew between said plurality of clock signals to be measured.

22. A clock skew measuring method as claimed in any one of claims 17 to 21, wherein said clock skew estimating step includes:

obtaining an edge timing of said reference signal as a reference timing;

obtaining an edge timing of each of said plurality of clock signals to be measured as a tested timing;

obtaining said timing difference between said tested timing and said reference timing; and

obtaining said clock skew between said plurality of clock signals to be measured from said timing difference obtained for each of said plurality of clock signals to be measured.

23. A clock skew measuring method as claimed in claim 22, wherein said clock skew obtaining step further includes correcting said clock skew obtained from said timing difference.

24. A clock skew measuring method as claimed in claim 22 or 23, wherein said obtaining of edge timing obtains a rising edge timing or a falling edge timing of each of said reference signal and said plurality of clock signals to be measured.

25. A clock skew measuring method as claimed in claim 22 or 23, wherein said timing estimating includes:

transforming each of said plurality of clock signals to be measured into a complex analytic signal;

obtaining an instantaneous phase of said analytic signal;

obtaining a linear instantaneous phase of each of said plurality of clock signals to be measured based on said instantaneous phase obtained; and

obtaining an ideal edge timing of each of said plurality of clock signals to be measured by obtaining an initial phase angle of said linear instantaneous phase.

26. A clock skew measuring method as claimed in claim 25, wherein said obtaining of edge timing includes:

removing said linear instantaneous phase from said instantaneous phase to obtain an instantaneous phase noise; and

re-sampling only data of said instantaneous phase noise around zero-crossing timings of a real part of said analytic signal to output a timing jitter sequence of each of said plurality of clock signals to be measured.

27. A clock skew measuring method as claimed in claim 25, wherein said transformation into said complex analytic signal includes:

extracting, from each of said plurality of clock signals to be measured, frequency components around a fundamental frequency

of said clock signal to output a band-limited signal; and

performing Hilbert transformation for said band-limited signal to generate Hilbert transform pairs of said clock signal.

28. A clock skew measuring method as claimed in claim 25, wherein said transformation into said complex analytic signal includes:

transforming each of said plurality of clock signals to be measured into two-sided spectra in a frequency domain;

extracting, from said two-sided spectra, frequency components around a positive fundamental frequency thereof; and

inversely transforming said two-sided spectra that has been band-limited into a time-domain signal.

29. A clock skew measuring method as claimed in claim 25, wherein said transformation into said complex analytic signal includes:

storing each of said clock signals to be measured;

selecting and extracting a section of said stored clock signal in such a manner that a section presently extracted partially overlaps a section previously extracted;

multiplying said extracted section by a window function;

transforming said multiplied section into two-sided spectra in a frequency domain;

extracting, from said two-sided spectra transformed in said frequency domain, frequency components around a positive fundamental frequency of said stored clock signal to be measured;

inversely transforming said spectra that has been band-limited into a time-domain signal; and

multiplying said time-domain signal by a reciprocal of said window function to obtain said analytic signal that has been band-limited.

30. A clock skew measuring method as claimed in claim 22, wherein

obtaining of said timing difference between said tested timing and said reference timing includes:

calculating a plurality of timing differences from said tested timing and said reference timing for each of said plurality of clock signals; and

obtaining a mean value of said plurality of timing differences, and

wherein said clock skew obtaining obtains said clock skew between said plurality of clock signals to be measured based on said mean value of said plurality of timing differences.

31. A clock skew measuring method as claimed in any one of claims 17 to 19, wherein said clock skew obtaining removes amplitude modulation components from said reference signal and each of said plurality of clock signals to be measured to extract phase modulation components thereof.

32. A clock skew measuring method as claimed in claim 26, wherein said obtaining of said edge timing further includes removing low frequency components of said instantaneous phase noise.